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A REVISION OF THE GENUS *MICRORHOPALA* IN NORTH AMERICA, NORTH OF MEXICO.

BY ROBERT HENRY McCAULEY, JR.,
Cornell University, Ithaca, N. Y.

HISTORY OF THE GENUS.

The generic name *Microrhopala* Chevrolat first appeared in Dejean's Catalogue of 1837* with four species listed under it. Of these *gagatina* Dej. is a nomen nudum, and two of the remainder were North American species: *Hispa vittata* Fab., and *H. excavata* Oliv.

In 1838, Newman described *Hispa xerene*, and in 1841 he described *Hispa erebus*. In 1853, Melsheimer in his "Catalogue of the Described Coleoptera of the United States" gave Chevrolat as author of the genus *Microrhopala* and placed within it *Hispa vittata* Fab., *M. porcata* Mels., *H. excavata* Oliv., *H. collaris* Say (later placed in *Odontota*), and *H. cyanea* Say, described in 1823. He retained the old genus *Hispa* and left in it *xerene* Newm. and *erebus* Newm. along with six other species. In 1859 Leconte described *laetula* in *Microrhopala*.

It remained for Baly in 1864 to write the first generic description of *Microrhopala*, and to designate *vittata* as the type species.

* There has been some doubt as to the exact date of the first appearance of the name *Microrhopala*. I use the date 1837 at the recommendation of Mr. H. S. Barber, from whose correspondence I quote the following in regard to the Dejean catalogues: ". . . the so-called 'editions,' and the title-page dates are not reliable and have led to many errors in the dating of names. I have examined copies with 4 or 5 title-page dates ranging from 1833 to 1837 but the earliest correct date for *Microrhopala* is 1837 in spite of the fact that it may be found in copies of the catalogue with title-pages bearing the prior dates."

He placed in *Microrhopala* the following four North American species and these are still recognized in the genus: *M. vittata* (Fab.), *M. excavata* (Oliv.), *H. xerene* Newm., and *M. bivitticollis* which he described as new, but which is in reality synonymous with *M. signaticollis* of Leconte, 1859, later a variety of *rubrolineata* (Mann.).

In 1873 Crotch described *melsheimeri* and included in the genus seven other species. *M. vittata* (Fab.), *M. xerene* (Newm.), *Odontota rubrolineata* Mann., *M. cyanea* (Say), *M. excavata* (Oliv.), *M. porcata* Mels., *Hispa plicatula* Fab. In his check list of the same year he listed these and included also varieties *laetula* Lec., *interrupta* Coup. and *signaticollis* Lec.

Chapuis in 1875 in his "Genera des Coléoptères" reaffirmed the designation of *vittata* (Fab.) as type by Baly and accredited the genus to Chevrolat. Another species, *floridana*, was added by Schwarz in 1878 and recognized by Horn in 1883, who at this time also described *dimidiata*, *vulnerata* and *montana*. He included also in the genus: *vittata* (Fab.), *xerene* (Newm.), *rubrolineata* (Mann.), *erebus* (Newm.), *excavata* (Oliv.), *cyanea* (Say), *porcata* Mels., and *melsheimeri* Crotch, and like Chapuis refers *Microrhopala* to Chevrolat. Horn, furthermore, took *plicatula* (Fab.) out of the genus and placed it in *Octotoma*.

J. B. Smith described *uniformis* in the genus in 1885, which species was recognized by Henshaw in his "List of Coleoptera of North America." He referred the genus to Baly and placed in it 13 species: *vittata* (Fab.), *dimidiata* Horn, *xerene* (Newm.), *rubrolineata* (Mann.), *vulnerata* Horn, *floridana* Schwarz, *erebus* (Newm.), *excavata* (Oliv.), *cyanea* (Say), *uniformis* Smith, *porcata* Mels., *montana* Horn, and *melsheimeri* Cr. Of these, four are not at present assigned to the genus, and another has dropped to subspecific rank. However Donckier de Donceel in his "Catalogue des Hispides," included all these American species and added to the list *bivitticollis* of Baly, although he recognized *signaticollis* (Mann.), and *laetula* Lec. as a variety of *vittata* (Fab.). He did not recognize that *bivitticollis* Baly was identical with *signaticollis* Lec.

In 1905 Weise removed *montana* Horn from the genus and placed it in *Brachycoryna*. He also took *melsheimeri* Cr. from *Microrhopala*, and renamed it *Brachycoryna horni*. He removed *M. dimidiata* Horn (1883) from the genus and synonymized it with *Pentispa melaneura* Chapman (1877). Weise placed in the genus, *Pentispa suturalis* Baly (1885). In 1906 Schaeffer described *M. arizonica*. In 1911 Weise synonymized this with *M. suturalis*

(Baly) which he returned to its original genus, *Pentispa*. Previous to this, in 1907, Weise relegated *M. porcata* Mels. to the genus *Uroplata*.

Microrhopala received no more attention taxonomically until 1925 when Van Dyk  described a new variety of *rubrolineata*, *militaris*, from California. Since this date, no taxonomic work has been done on the genus.

In this paper the generic name *Microrhopala* is referred to Dejean who published it for the first time in his "Catalogue des Col opt res" in 1837. He included in the genus, which he referred to Chevrolat, four species indicating his conception of it. Chevrolat did not publish the name *Microrhopala* in any connection. Consequently the name must be referred to Dejean.

DESCRIPTION OF THE GENUS.

Head small, rounded, free from prothorax; vertex marked with three longitudinal grooves of which the middle one is straightest and best defined, lateral grooves sometimes more or less irregularly broken into longitudinal punctures; sutural line between front and clypeus more or less raised, forming a transverse carina; labrum rather large, transverse, truncated; maxillary palpi short, last joint pointed and long as the preceding two together; eyes not prominent, oval, encircled by fine punctures which continue to sides of buccal orifice; antennae short, about as long as head and thorax together, somewhat club shaped; first segment rather large; second to sixth slightly obconical and nearly equal in diameter; seventh abruptly swollen, larger; eighth to eleventh inclusive united into an oval mass, with only slight indications of segmental divisions; eleventh segment somewhat flattened apically at a vertical, oblique angle, and abruptly produced to a point.

Prothorax broadly transverse, anterior edge straight or very gently arcuate, posterior edge subsinuate on each side, angles subacute, lateral edges arcuate to nearly straight and usually slightly explanate; anterior lateral angles usually slightly produced, each bearing a single curved setiferous hair; dorsal surface convex, more or less densely and deeply punctured; scutellum transverse, nearly rectangular, slightly arcuate behind.

Lateral edges of elytra slightly divergent and uniformly rounded apically; eight rows of punctures always arranged longitudinally in four pairs of rows; punctures sometimes

more or less confluent and confused, intervals regular, may or may not be raised, never have more than two punctures between them; humeri prominent or not, edges explanate, serrate or not; medial edges raised at slight angle causing medial row of punctures to appear impressed; prosternum somewhat furrowed in middle, widened and rounded at base; femora straight or nearly so, larger at middle and apically; fore and hind tibiae gradually enlarged apically; middle tibia slightly curved, brushlike hairs at inside of apex; first joint of tarsus small, fourth joint rather long, exceeding by a third the lobes of the preceding, armed with divergent claws, which are separated by a so-called subungual plate.

Abdomen with five segments.

The sexes differ externally only in size, the male being somewhat smaller.

The genitalia of *Microrhopala* in common with other genera of the subfamily *Hispinae* are of little taxonomic value. During the winter of 1935-36 the male genital tubes of a large series of individuals from all the species in the genus were carefully dissected out and mounted upon hairs. The results were very disappointing. At first, slight differences seemed to be apparent between species, but as the series were extended it was soon obvious that these differences were no greater than the differences existing between members of what were unquestionably the same species. In no instance was a character observed which was either constant, distinct, or describable enough to be used taxonomically. The female genitalia showed even less and in addition are difficult to preserve in a position undistorted as well as practical for observation.

KEY TO SPECIES AND VARIETIES OF MICRORHOPALA.

1. Dorsal surface unicolorous 2
 Dorsal surface of more than one color 6
2. Only the interval between the 6th and 7th rows of punctures raised 3
 Intervals between 6th and 7th rows and between 4th and 5th rows of punctures each raised, or by reason of very large coarse punctures striae irregular or obscure 4
3. Elytral serrations strong and distinct.
 Abnormal specimens of *M. excavata*
 Elytral serrations absent or weak and indistinct ... *M. cyanea*
4. Elytral humeri not prominent, prothorax nearly as wide as humeri, in proportion as 5:6, sides of pronotum nearly straight, subparallel *M. floridana*

Elytral humeri prominent, prothorax more distinctly narrower than humeri, less in proportion than 5:6, sides of pronotum convex or angled, strongly divergent at base 5

5. Punctures large, deep, contiguous, rows irregular, surface very coarsely sculptured, sides of pronotum convex only slight suggestion of angle; specimens from extreme Southeast.

M. erebus

Punctures not contiguous, rows not very irregular, surface not coarsely sculptured, sides of pronotum with distinct median angle, specimens from Gulf, Central, or Atlantic states *M. excavata*

6. Edges of elytra not serrate *vittata*
Edges of elytra serrate 7

7. Ventral surface metallic blue 8
Ventral surface black 11

8. Elytra without markings *rubrolineata* var. *signaticollis*
Elytra with markings 9

9. Vittae narrow, between fourth and fifth rows of punctures.

rubrolineata

Vittae wider, not bounded by fourth and fifth rows of punctures 10

10. Vittae narrower posteriorly becoming obsolete at posterior third *rubrolineata* var. *vulnerata*

Vittae truncate before middle, obsolete posteriorly.

rubrolineata var. *militaris*

11. Elytral vittae normal, entire *xerene*
Elytral vittae interrupted for a short distance posterior to the middle *xerene* var. *interrupta*

Microrhopala vittata (Fab.).

1798 *Hispa vittata* Fabricius, Suppl. Ent. Syst., p. 117.

1837 *Microrhopala vittata* Dejean, Cat. Coléoptères, p. 389.

1859 *Microrhopala laetula* Leconte, Col. Kans., Smithsonian Contribution to Knowledge, 2: 27-28.

1864 *Microrhopala vittata* Baly, Ann. Mag. Nat. Hist. 14: 268-269.

Description.

Length 5.5 mm-7.5 mm.

General outline elongate oval, divergent posteriorly. Genae coarsely punctate below eyes; median longitudinal carina on vertex between antennae; color mostly yellowish red, darker, often black, between eyes and around buccal orifice.

Lateral edges of pronotum variable, nearly straight or evenly curved to obtusely angulate; dorsal surface coarsely, shallowly, but not densely punctate, usually with single incomplete median longitudinal groove; color in life decidedly red; dried specimens much duller, variable, light yellowish red to reddish brown; anterior and lateral edges dark brown or black, especially in eastern material, sometimes a variable, dark, median longitudinal band.

Elytral humeri not prominent; dorsal punctures more or less elongate, more elongate in medial row; interval between fourth and fifth rows of punctures more or less raised, interval between sixth and seventh less raised; edges of elytra never dentate, very slightly foliaceous; color in life black, vittae red, like pronotum; dried specimens brown to nearly black, interval (vittae) between fourth and fifth puncture rows, and outer edges of elytra, yellowish red; some specimens somewhat metallic, with bluish or greenish reflections.

The variety *laetula* described from Fort Riley by Leconte in his "Coleoptera of Kansas," 1859, as a new species is of interest in that no specimen examined by the writer agrees in all respects with the original description. Individuals do occur, not uncommonly, which agree perfectly in color of head and thorax with Leconte's description. Such specimens are however not confined to the West nor to any determinable locality as habitat. The thorax of *vittata* only rarely has straight edges, and in such casts there seems to be no corresponding relation to color. According to the original description of var. *laetula* the vittae are abbreviated, a condition occurring in only a very few specimens where again the other color characters and the edges of the thorax are quite variable alone and in relation to each other. The abbreviated vittae themselves are of two types: the entire interval between the fourth and fifth rows of punctures may be raised, (only the color fading out posteriorly, or the interval may be raised) only as far as it is colored, usually one third to one half the length of the elytra. Two specimens of "*laetula*" are therefore seldom alike. In view of the fact that "*laetula*" even as a variety is a form so difficult to delimit structurally, geographically and even as to color it seems that it should be treated as a mere aberration of *vittata*.

The writer has seen one specimen from Colorado Springs, Colorado, now in the U. S. National Museum Collection, which has neither any indication of vittae nor raised intervals. The elytral punctures in this specimen are small, shallow and elongate, resembling the punctures nearest the elytral suture in normal specimens.

The sides of the pronotum are straight and slightly divergent. The dorsal punctures are rather sparse and appear less deep than in the average specimen of *vittata*. The head is black except for a dull rufus occipital spot on either side. Horn, Trans. Amer. Ent. Soc. Philad. 1883 describes such a specimen as a variety of *vittata* but gives it no name: "A specimen from Colorado has the elytra entirely black, without vitta, the head is also fuscous." It is reasonable to assume that such a specimen is a rare aberration of *vittata*. Other specimens from Colorado Springs show no deviations from the normal *vittata*. To the inexperienced eye, this specimen without vittae appears to deserve the status of a new species. A closer examination however reveals the form and general configuration of *vittata*. Those specimens having abbreviated vittae in conjunction with abbreviated raised intervals are obviously intermediate forms. The elytral configuration posterior to the short vittae and intervals corresponds exactly with the entire dorsal configuration of the specimen having no vittae.

The exact shape of the lateral edges of the pronotum is quite variable throughout the species. This is also true to a lesser extent of the number and coarseness of the dorsal pronotal punctures. It is not difficult to conceive such an aberration occurring in so variable a species.

Description of Larva

General form grublike, subcylindrical, tapering posteriorly.

Head heavily chitinized, set deeply into prothorax; front separated from two posteriorly projecting lobes of occiput by anteriorly divergent laterally oblique sutures; clypeus fused to front; labrum transverse, nearly rectangular, shallowly and widely emarginate at middle; mandible projecting slightly beyond labrum, sturdy, tridentate, middle tooth largest; maxilla broad, blunt, lacinia with long slender teeth, in close approximation to galea, two segmented maxillary palpi lateral to these; labium transversely oval, straight posteriorly, no palpi; gula wide longitudinally rectangular; postgenae lateral to gula, longitudinal, wider behind; three ocelli on each side of head, triangularly placed immediately laterad of the frontal sutures; antennae three segmented, mediad to the sutures.

Thorax not chitinized, except transversely oval dorsal patch, and ventral patch wider in front, truncate behind, constricted somewhat past middle, on prothoracic segment; legs present on all segments; coxae, femora, tibiae present, tarsi very short, single claw between two fleshy divergent lobes; mesothoracic segment with spiracles.

Abdomen seven of nine segments extending laterally in nipple like projections surmounted by a small blunt chitinized tip which turns somewhat posteriorly; spiracles present in all but last segments.

Description of Pupa

General appearance slightly shorter than last larval instar, more oval in outline, less depressed; color white at first, changing to brown.

Head concave anteriorly, wide in proportion to first thoracic segment; antennae bent downward and sideward to place at side ventrad to humeri.

Prothorax wide, smooth, set dorsally with four bristles arranged as a symmetrical trapezoid, narrower posteriorly, within a larger rectangle, two bristles on each side lateral to anterior corners of rectangle, three bristles at lateral edges, in longitudinal row just above posteriorly bent antennae, each bristle set in a small tuberosity; meso- and metathorax shorter, wider, each slightly produced posteriorly; wings appressed at sides, bent ventrad, thrust between mesothoracic and metathoracic legs, reaching just past posterior edge of third ventral segment, striations visible.

Abdomen with lateral tubercles reduced, each with three spines, spiracle 1-5 distinct, spiracles 6-7 faint; dorsally 6 spines on each segment, each set in tubercle, one on each side, and two pairs mediad, arranged as a symmetrical trapezoid, narrower posteriorly, anal segment with only four spines, transverse rows of eight each set on tubercles, medial six in pairs; lateral spines in segment 7 modified to shorter spike-shaped tuberosities; anal segment, spines surround anus, six hooks present, one on each side of two beneath, and two above anus.

Distribution

Vittata is the most widely distributed of the species of *Microhopala*. The most numerous records are in the East which has been more closely collected than other regions. It probably occurs in every state, with the possible exception of Arizona and New Mexico, and in the southern provinces of Canada from east to west.

Type Locality: "Carolina."

Locality Records

Maine: Old Orchard; Wells Beach. *New Hampshire*: Ossipee; Rye. *Massachusetts*: Beverly; Brookline; Cohasset; Faneuil Station; Lynn Beach; Marion; Nahant; Needham; Sherborn; Tewks-

bury; Tyngsboro; Winthrop Beach; Woods Hole. *Connecticut*: Georgetown; Glenville; Litchfield; Sound Beach; Stamford. *New York*: Aqueduct, L. I.; Brownsville; Cayuta Lake; Crugers; Farmingdale, L. I.; Fort Lee; Ithaca; Kissena Lake, L. I.; Larchmont; Middletown; N. Fairhaven; Nyack; Oak Orchard Swamp; Pelham Park; Schenectady; Sea Cliff; Staten Island; Troy; Van Cortlandt Park; West Farms. *Pennsylvania*: Philadelphia. *New Jersey*: Alpine; Anglesea; Arlington; Elizabeth; Lakewood; Larchmont; Paterson; Wildwood. *Virginia*: E. Falls Church. *South Carolina*: Clemson College. *Georgia*: Savannah. *Michigan*: Cheboygan Co.; Detroit; Douglas Lake. *Indiana*: So. McAlester. *Illinois*: Palos Park; McBride. *Iowa*: Lake Okoboji; Benton Co. *Manitoba*: Aweme; Baldur; Melita. *Nebraska*: Omaha (Childs Point). *Kansas*: Linn Co; Douglas Co. *Texas*: Colorado Co. *New Mexico*: Lake Earford. *Colorado*: Colorado Springs; Wray. *Utah*: Provo. *California*: Florence (Florence Co.). *Montana*: Roundup. *Oregon*: Freewater; Huntingdon; Newport. *Washington*: N. Yakima; Pasco; Spokane; Sprague; Wawawai. *Alberta*: Lethbridge. *British Columbia*: Kamloops; Keremeos.

Biology

All the species of *Microrhopala*, north of Mexico at least, as far as is known are leaf miners in the larval state and external feeders as adults. All are apparently restricted to the members of the family *Compositae*. *Vittata* has been recorded upon the following plants: *Silphium laciniatum* L.—Hendrickson 1930; *Solidago sempervirens* L.—Harris 1935; *S. canadensis* L.—Chittenden 1902, Ross 1936, and other observers; *S. juncea* Ait.—Ross 1936; *S. graminifolia* (L.) (*lanceolata*)—Chittenden 1902. There is also an unpublished record of its occurrence upon *S. missouriensis* Nutt. Ross, 1936, has observed that it does not attack *S. rugosa* Mill. It seems to prefer species of *Solidago* to all other plants.

It passes the winter in the adult state in the ground among the bases of the stalks of the host plant and beneath rocks and logs. At Breesport, New York, two were taken April 1, 1936, from beneath stones by Harvey Scudder. Hendrickson (Can. Ent. 1930) reports finding three adults about four inches below the surface of the ground among the bases of old stalks near Ames, Iowa, on May 6, 1927.

As soon as the weather becomes warmer, and the first leaves of the goldenrod have appeared, the adults may be found crawling about over the leaves. Copulation and oviposition begin immediately. Hendrickson observed oviposition near Ames, Iowa, as

early as May 7, 1927. In a small field at Ithaca, N. Y., I have observed these processes on May 16, 1936, and again at the same place one week later.

In ovipositing, the female lays one or more closely appressed clusters of eggs usually numbering less than ten in a cluster. Hendrickson (1930) observed them deposited near the apex on the upper surface of a basal leaf of *Silphium laciniatum* L. On *Solidago canadensis* L. at Ithaca I have observed eggs deposited also near the apex of the leaf, but usually on the underside and on blades near the middle of the plant axis. The eggs are oval in shape, flat, white, and lie at an angle to the surface so that one end of each egg touches the leaf. This arrangement may be likened to a row of bricks placed close together on end, that have been pushed over so that all still lie close together, but resting upon each other at an angle to the supporting plane surface. After each cluster is laid the female proceeds very carefully to cover it with a brownish substance, which may be excremental. The tip of the abdomen is passed backward over the eggs and when brought forward the semi-fluid, muddy material is distributed over them in a wide band. This is repeated until the cluster is entirely covered. In a short time this material dries, becomes black and hard, and firmly presses and glues the eggs against the surface of the leaf. Several such clusters of eggs are laid together in parallel, contacting rows. Often several egg masses lie closely together, and tend to wrinkle the leaf near the tip.

The developing embryo lies head downward, and upon hatching, the larva needs only to begin eating to enter the leaf. The position of the legs of the embryo just before hatching is variable. In alcoholics they may be directed posteriorly on both sides of the body, or posteriorly on one side and anteriorly on the other. These variations in position possibly result from movements before hatching.

The time necessary for hatching is probably somewhat less than three weeks. Hendrickson reports hatching on May 28, 1927, at Ames just twenty-one days following oviposition. Ross (1936) in his thesis on Cecidology of *Solidago* says: "The larvae arrive about the first of June. They mine the leaves of both vegetative shoots and uprights making sacklike pockets therein in which pupation takes place and which are later used by the adults for shelter against sunlight and storm." With regard to the appearance of the mines and the duration of feeding I quote Hendrickson (1930): "Following the mining of the leaf, the upper and lower epidermis became brownish and bulged out slightly. From observations of

ink marks placed on the upper epidermis of the leaf, it appeared on June 23 that the larvae had stopped their feeding." According to my own observations the mine is elongate, and somewhat inflated as indicated above. It is often occupied by more than one larva. They are not confined to a single mine but are able to leave it and migrate to another leaf.

There is no published data, to my knowledge on the number of larval instars that occur. I have seen larvae, however, of four and possibly five different stages.

With regard to time necessary to reach the pupal stage, Hendrickson (1930) observed that pupation had already taken place on the above date when the mine referred to was taken indoors and several pupae were observed within the mine. This would seem to fix the larval period at something less than twenty-six days. Harris (1835) also noted that pupation occurred within the mines, and marked its duration as about one week. Hendrickson (1930) reports an identical observation. Of the pupae taken June 23 (1927) he says: "Three adults appeared on June 29, and two more June 30. A pair mated and a few uncovered eggs were laid by the female July 2."

It is not known definitely how many generations appear in a season, but it is apparent from my own observations as well as those of Hendrickson (1930) that there are at least two.

The adults after emergence begin feeding externally upon the host, continuing the ravages of the larvae by feeding upon the edges and surface of the leaves after causing holes to appear in them.

No predacious enemies have been recorded for *vittata* but it is probable that it is fed upon by a number of predatory insects. Birds must also take a considerable toll. Of parasites, Chittenden reports it to be host for an undesigned Chalcid.

M. vittata is itself the accidental enemy of certain other insects. Ross states that the larval Cecidomyid *Eurosta solidaginis* Fitch is seriously affected by damage to its host plant and gall.

Microrhophala excavata (Oliv.)

1808 *Hispia excavata*—Olivier, Entomologie, V. 6, p. 775, pl. II.

1837 *Microrhophala excavata*—Dejean, Cat. Col. p. 389.

Description

Length 4.5–6.5 mm.

Head with three longitudinal grooves on vertex equal in width.

Dorsal surface of pronotum densely and deeply punctured, sides of pronotum with distinct median angle.

Lateral edges of elytra gently diverging and distinctly serrulate, surface coarsely punctured, punctures of the medial rows smaller, more elongate and regular, punctures of the lateral rows larger, coarser, somewhat confluent, intervals between 4th and 5th, and 6th and 7th puncture rows raised in all but a very few specimens.

Excavata varies more in general color than any other *Micro-rhopala* excepting *cyanea*. It is usually entirely bluish black or bluish violaceous with the ventral surface submetallic and darker. Specimens from the south are often bronzed. The ventral surface is submetallic and dark. *Excavata* likewise varies considerably in sculpture and in such instances may be difficult to distinguish from *erebus* and *cyanea*. *Cyanea*, however, is smoother in appearance and shows less difference in size of medial and lateral punctures; and in *excavata* the puncture rows are always straighter and never as confused as in *erebus*.

Distribution

Excavata has been most extensively collected in the East and N. East. It is found in New Brunswick and all the Atlantic States with the possible exception of Florida. It is found in western Kansas and probably elsewhere in the Mississippi Basin.

Type Locality "l'Amerique septentrionale."

Locality records

New Brunswick: Bathurst; St. John. *Quebec*: Chelsea; Wright. *Ontario*: Go Home Bay; Honey Harbor; London; Ottawa. *Maine*: Hollis; Lake Sebago; Mount Desert; Salisbury Cove; Southport. *New Hampshire*: Crawford Notch; Franconia; Lancaster; Milton; Mt. Washington; Valley Meadow (White Mts.); Wilton. *Massachusetts*: Brookline; Sherborn; Tyngsboro. *Connecticut*: Litchfield. *New York*: Big Indian Mountain (Catskill Mts.); Canton; Chateaugay Lake (Adirondack Mts.); Ithaca; West Point. *Pennsylvania*: Hummelstown. *New Jersey*: Atco; Lahaway; Middlesex County; Montclair; Plainfield; Ramsey. *Maryland*: Bladensburg. *West Virginia*: White Sulphur Springs. *Virginia*: Glencarlyn; Skyland (Page Co.). *North Carolina*: Highlands; Southern Pines. *South Carolina*: Beaufort. *Alabama*: Chickasaw; Mobile. *Mississippi*: Richton. *Illinois*. *Kansas*: Linn Co., Pottawatomie Co., Riley Co.; Wallace Co. *Minnesota*: Mara.

Microrhopala cyanea (Say)

1823 *Hispa cyanea*—Say, Journ. Acad. Nat. Sci. Philad. 3: 433.

1841 *Hispa hecate*—Newman, Ent., London 1: 77.

1853 *Microrhopala cyanea*—Melsheimer, Cat. desc. Col. U. S. p. 119.

Hispa hecate *ibid.*

1873 *Microrhopala cyanea*—Crotch, Proc. Acad. Nat. Sci. Philad. 25: 82–83.

Description

Length 4.5 mm.–6.5 mm.

Head finely punctate at occiput. Anterior edge of pronotum straight, posterior edge arcuate at middle, lateral edges more or less sinuate, dorsal surface coarsely punctate. Edges of elytra parallel anteriorly, slightly divergent posteriorly and of elytra parallel anteriorly, slightly divergent posteriorly and becoming rounded, humeri not prominent as in *erebus*, more so than *floridana*; edges gently serrate apically or not; punctures in four pairs of even rows, smaller throughout than in any other unicolorous species, interval between sixth and seventh rows distinctly raised, occasionally not after anterior third; dorsum bluish violaceous, blue, green or coppery, usually decidedly metallic; venter similarly colored, darker, more metallic.

Microrhopala cyanea is the most metallic and the most variable in color of any species in this genus. There are specimens which exhibit bronze, green, blue or purple as well as various degrees of each. These phases are possibly correlated with the geographical distribution of the insect, though there is small evidence to show it.

Distribution

Cyanea is found in the central part of the United States in a broad diagonal belt from Utah and Arizona to Manitoba.

Type Locality—Region of Rocky Mountains.

Locality Records

Illinois: Palos Park; Witlo Springs. *Manitoba*: Aweme. *Iowa*: Lake Okoboji. *Kansas*: Arkansas River Valley; Bourbon Co.; Clarke Co.; Douglas Co.; Ellis Co.; Ford Co.; Kiowa Co.; Linn Co.; Logan Co.; Norton Co.; Reno Co.; Riley Co.; Rooks Co.; Scott Co.; Sylvia; Wallace Co. *Colorado*: Estes Park; Regnier. *Utah*: St. George; Zion Canyon. *Arizona*: Prescott.

Microrhopala erebus (Newm.)1841 *Hispa erebus*—Newman, Ent. London 1: 77.1878 *Microrhopala erebus* Schwarz, Proc. Amer. Philos. Soc. Philad. 18: 369.*Description**Length*—5 mm.—6.5 mm.

Oblong ovate, broader proportionate to length than any other species. Head sparsely punctate, vertex with 3 longitudinal striae of equal width. Pronotum considerably wider posteriorly, much narrower than elytra; anterior edge straight, posterior edge broadly arcuate at middle, lateral edges sinuate, usually distinctly angulate. Elytra parallel basally, gently divergent, becoming rounded apically, humeri more prominent than in any other species, edges of elytra coarsely serrate, surface very coarsely punctate, punctures always irregular and contiguous, especially at sides; color uniform blue black throughout.

In *erebus* there is little or no color variation. The insect is always a uniform blue black. Its exceedingly rough configuration makes it one of the most distinct species. Although a few specimens of *excavata* are so coarsely sculptured as to resemble *erebus* the distribution and the proportionately narrower prothorax of *erebus* will serve to distinguish them.

Distribution

Erebus is found exclusively on the Florida peninsula as far as records I have been able to accumulate show. It possibly extends into neighboring states in the Gulf strip.

Type locality—"St. John's Bluff in East Florida."

Locality Records

Florida: Capron; Cedar Keys; Clearwater; De Leon Springs; Dunedin; Enterprise; Fort Myers; Indian River; Marco; Ormond.

Biology

Of this species Blatchley makes the following note: "Nov.—Apr., on oak, goldenrod and low herbage."

Microrhopala floridana Schwarz

1878 *Microrhopala floridana*—Schwarz, Proc. Amer. Philos. Soc. Philad. 18: 369.

Description

Length app. 5 mm.

Form more nearly parallel, and width of base of pronotum more nearly approaching width of elytra than in any other species. Head not coarsely punctate, of three longitudinal grooves on vertex, middle one is widest. Thorax at base slightly wider than long, sides nearly straight, nearly parallel; posterior edge of pronotum arcuate in middle, sinuate at sides, surface coarsely, evenly punctate. Intervals between fourth and fifth, and sixth and seventh rows of elytral punctures distinctly and rather strongly carinate; edges faintly or not dentate, humeri characteristically never prominent. Color bluish black, moderately shining.

This is a rather small species appearing more cylindrical in outline because of the proportionately wider prothorax and the very slight prominence of the elytral humeri. It is not noticeably variable in color, never deviating from a uniform, very dark blue black.

Type—U. S. National Museum.

Distribution

As its name implies, the center of distribution for *floridana* is Florida. It does, however, extend northward into Georgia and westward into Alabama.

Type Locality—Sumpter County, Florida.

Locality Records

Alabama: Kushla. *Florida*: Baldwin; Bartow; Dunedin; Enterprise; New Smyrna; Sumpter County; Tampa. *Georgia*: Billy's Island (Okefinokee Swamp).

Biology

Very little is known of the life history and biology of this species. It has been reared by Messrs. Hubbard and Schwarz at Crescent City and Bartow Junction, Florida, from larvae found mining in the terminal portion of the leaves of grass-leaved golden aster, *Chrysopsis graminifolia* (Michx.). Blatchley makes the following note; "Dec.-Apr., on the hoary lupine, *Lupinus diffusus* Nutt."

Microrhopala xerene (Newm.)

1838 *Hispa xerene*—Newman, Ent. Mon. Mag. London.
5: 390.

1864 *Microrhopala xerene*—Baly, Ann. Mag. Nat. Hist.
14: 269.

1865 *Microrhopala xerene* var. *interrupta*—Couper,
Canad. Nat. and Geol. 2: 63.

Description

Length 4.5 mm.—5.5 mm.

Head black, rather densely punctate.

Pronotum closely punctate, edges posteriorly nearly parallel, anteriorly convergent before middle, lateral margins slightly foliaceous; black, with two wide longitudinal reddish yellow bands, occasionally absent.

Elytral humeri rather prominent, lateral edges of elytra nearly parallel, edges very faintly dentate posteriolaterally; eight regular rows of deeply impressed punctures, deeper laterally, shallower and more elongate medially.

Color black, vittae yellow, raised, width variable, length from bands on pronotum to juncture of fourth and fifth rows of punctures, elongate reddish yellow spot at angle of interval between second and third rows.

Var. interrupta—Resembles typical form except that: "A reddish yellow stripe near the lateral margin of the thorax is continued on half the elytra, occupying the distance of thirteen punctures, where it terminates,—but the stripe occurs again on the same laevigated ridge, posteriorly for the length of five punctures." This variety occurs in the northern range of the typical form.

Xerene is one of the least variable species of *Microrhopala*. There is little or no variation in size, and structure. The only color variation aside from that named var. *interrupta* is a form in which the prothorax is entirely black, a rather rare aberration.

Distribution

Microrhopala xerene is essentially an Eastern species and is found most commonly in the eastern Canadian Provinces and the Atlantic States north of Florida. I have seen specimens however labeled "Lethbridge, Alberta"; "Colorado Springs, Colorado"; and "Texas." The var. *interrupta* is usually northern, found in northern New York, Vermont, New Hampshire, Maine and Canada. Among a series in the National Museum labeled "Texas" there is a specimen of *interrupta*.

Type Locality—var. *interrupta*—Hermitage, North of Quebec.

Locality Records

New Hampshire: Franconia. *Massachusetts*: Lowell; Mt. Washington; Stow. *Connecticut*: Cornwall; Litchfield. *New York*: Illion; Ithaca; Oneonta; Suffern; Troy. *Pennsylvania*: Germantown; Glenolden; Philadelphia. *New Jersey*: Atco; South Camden. *District of Columbia*. *Virginia*: Falls Church; Glen-carlyn; Great Falls. *West Virginia*: White Sulphur Springs. *North Carolina*: Black Mountains; Swannea Valley. *Georgia*: Savannah. *Texas*. *Colorado*: Colorado Springs. *Alberta*: Cypress Hills; Lethbridge.

Biology

Like the other members of the genus no extensive work has been done upon the life history of *M. xerene*. The only study has been made by Chittenden, 1902. Of the food habits I quote: "the larvae—has been found mining the leaves of several genera of *Compositae*, although different species of goldenrod appear to constitute its principal food. The plants upon which the larvae have been observed to make their mines and from which the beetles have been reared include: *Solidago canadensis*, *caesia*, *juncea*, et al.; *Boltonia asteroides*; *Seriocarpus asteroides*, or toothed white topped aster, and several species of the true aster or starwort."

Essentially the life history of *xerene* seems to closely resemble that of *vittata*. The eggs are smaller and are likewise closely appressed to the surface of the leaf to which they are attached. They are coated with dark, nearly black excrement, sometimes all the eggs of a group being covered by a common coating. Usually the eggs are placed on the lower surface of the leaf near the apex, but occasionally a few are laid on the upper surface.

The larvae have the power to pass from leaf to leaf, and in captivity have been seen to leave the mine and reenter the leaf at a fresh point.

The mines are variable and sometimes occupy a considerable portion of the leaf, occasionally harboring as many as four individuals. At the point where the pupal cell is formed the mine puffs up to form a hard blister, rather rounded oval in shape, usually a little over an eighth of an inch wide, which sometimes becomes as thick through, its dimensions dependent upon the number of individuals inhabiting it.

The pupal state lasts from four days to about one week. The pupae are able to move by elevating the abdominal segments and

moving forward the last segment, thus giving a forward impetus when the body is straightened. They have been observed to make as many as twenty consecutive movements.

Four parasites have been reared from this leaf miner near the District of Columbia: *Eurytoma albitarsis* Ashm. from mines in Solidago, *Closterocerus tricinctus* Ashm. from a mine in *Seriocarpus asteroides* (L.) BSP. *Tetrastichus microrhopalae* Ashm. from dried larval skins, July 7-14, *Mesocrena microrhopalae* Ashm.—a single example reared July 6 from a white cocoon in a mine of this beetle.

The above observations are from Chittenden.

Microrhopala rubrolineata (Mann.)

- 1843 *Odontota rubrolineata*—Mannerheim, Bull. Soc. Nat. Moscou 2: 307.
- 1859 *Microrhopala signaticollis*—Leconte, Proc. Acad. Nat. Sci. Philad. 11: 82.
- 1864 *Microrhopala bivitticollis*—Baly, Ann. Mag. Nat. Hist. 14: 268-271.
- 1873 *Microrhopala rubrolineata* Crotch, Proc. Acad. Nat. Sci. Philad. 25: 82-83.
- 1883 *Microrhopala vulnerata*—Horn, Trans. Amer. Ent. Soc. Philad., 10: 291, 292.
- 1911 *Microrhopala rubrolineata* var. *vulnerata*—Weise, Ann. Soc. Ent. Belgique 55: 72-74.
- 1925 *Microrhopala rubrolineata* var. *militaris*—Van Dyke, Pan-Pac. Ent. 1: 173.

Description

Length from 4 mm. in var. *militaris*, 4.5-5.5 mm. in *rubrolineata*, to 6 mm. in var. *signaticollis*.

Similar to *xerene* in shape, slightly larger.

Pronotum with close, deep, never closely appressed punctures, anterior edge nearly straight, slightly arcuate, posterior edge widely arcuate, lateral edges more or less sinuate, usually less foliaceous than in *xerene*, anterior angles more produced.

Elytra subparallel, rounded apically, four pairs of rows of close, even punctures, edges more distinctly and strongly serrate than in *xerene*.

Color bluish or violaceous, often metallic, pronotum marked with two lateral longitudinal reddish yellow bands; elytra with reddish yellow vittae on raised interval between fourth and fifth puncture rows, sub-apical spot when present, at juncture

of second and sixth intervals; venter always metallic blue or blue black.

The pronotum sometimes has no color markings and is entirely unicolorous blue or blue black. *Rubrolineata* in color markings at least, is the most versatile member of the genus. Three named varieties are mentioned below, but the variations of color and pattern do not end here. The elytra markings vary from no markings at all as in var. *signaticollis* to very broad marks extending the full length of the elytra making them appear more reddish yellow than blue. The color pattern of the thorax varies in the same manner from no light markings at all to conditions where there remains only a narrow median dark line. The color also varies from bright metallic blue to very dark violaceous. The metallic blue venter is, however, a very constant character.

Distribution

Rubrolineata is in a sense the western counterpart of *xerene*. It occurs most commonly, and with the greatest degree of variation in California and Arizona. I have seen a specimen in the National Museum Collection labelled "St. Louis, Mo.," a very unusual record.

Type Locality—California.

Locality Records

California: Carpenteria; Huntingdon Beach; Indian Joe Spring; Island Mountain, Trinity Co.; Long Beach; Orange Co.; Riverside; San Diego; San Pedro; Tehuachapi; Whittier. *Arizona*: Chiricahua Mountains; Huachuca Mountains; Santa Catalina Mountains. *New Mexico*: Alamogordo. *Colorado*: Denver. *Missouri*: St. Louis.

Biology

I have seen specimens of *M. rubrolineata rubrolineata* (Mann.) from Santa Catalina Mountains of Arizona taken on *Franseria acanthicarpa* (Hook.) Coville. A specimen from St. Louis, Missouri, much larger than the average *rubrolineata*, was taken on *Helianthus hirsutus* Raf.

Microrhopala rubrolineata var. *vulnerata* Horn

Description

Size, form, sculpture as in var. *rubrolineata*.

Thorax black or blue black without markings. Elytra black

or blue black, vittae widened basally from fourth to seventh puncture rows inclusive, narrower apically, obsolete after apical fourth of elytra. Variable.

In some specimens the elytral vittae are narrower, or longer, or shorter. In others the pronotum may have two longitudinal lateral reddish yellow bands as in *rubrolineata*.

Type—Philadelphia Academy of Sciences, Philadelphia.

Type Locality—Arizona.

Locality Records

Arizona: Hot Springs; Huachuca Mountains; Oak Creek Canyon; Santa Rita Mountains; White Mountains. *California*: Prescott.

Biology

The only notation relating to the biology of *M. rubrolineata* var. *vulnerata* Horn is the following note in the Pan-Pacific Entomologist, 1925, by W. W. Jones and H. Brisley. "*Microrhopala rubrolineata* var. *vulnerata* Horn, while collecting mined leaves of *Solidago californica* Nutt. near the summit of Mingus Mountain, 7500 feet, adjacent to Jerome, on August 28 (1929) beetle larvae were found to be present. Adults were secured from mines very soon thereafter. The mines were quite numerous and relatively large. They were not noted elsewhere."

Microrhopala rubrolineata var. *signaticollis* Lec.

Description

Resembles *rubrolineata* in size, form and configuration. Elytral vittae entirely absent, elytral surface unicolorous. The pronotum usually has the typical reddish yellow lateral markings, but these are sometimes completely obsolete. In the latter condition the specimen may be confused with one or more of the normally unicolorous species. It is readily separated from any of these by its extreme western occurrence, and by the punctures which are close, regular and nearly the same size throughout.

Type—Museum of Comparative Zoology, Cambridge.

Type Locality—Tejon, California.

Locality Records

California: Ahwahnee; El Cajon; El Taste; Indian Joe Spring; Lancaster; Los Angeles; Palm Springs; San Diego; Santa Rosa;

Tasajara Hot Springs, Monterey County to Tuolumne County; Tehachapi.

Microrhopala rubrolineata var. *militaris* Van Dyke

Description

Thorax reddish yellow, dark area reduced to median longitudinal line. Humeral region of elytra with wide, squarish, reddish, yellow mark, sharply obsolete before middle of elytra.

Rubrolineata is perhaps the most variable of the species of *Microrhopala*. There are numerous other patterns of both pronotum and elytra which might be named as new varieties. There seems to be nothing to be gained by this, however, at least not until a much larger amount of material is accumulated, in order that the range of the various phases, if possible, can be worked out. There is some doubt of the feasibility of this because of the possibility of free interbreeding between various color forms at the edges of their respective localities. At any rate the problem can only be adequately worked out by an investigator who has available considerably more material than has been accumulated in the east.

Type—Museum of the California Academy of Sciences.

Type Locality—Siskiyou County, California.

Locality Records

Arizona: Grand Canyon; Hot Springs; Williams. *California*: Lancaster; Los Angeles; Mount Shasta District.

SPECIES ERRONEOUSLY PLACED IN THE GENUS MICRORHOPALA.

Uroplata uniformis (Smith) new combination.

This southwestern species so closely resembles *Uroplata porcata* (Melsheimer) that it is difficult to separate it from that species. Smith compares the two as follows: "Differs from *porcata* by not having the vertex sulcate, by the longer thorax, the sides more distinctly arcuate, and by the more robust form." I have found it very difficult to separate the two species with certainty except by their locality data. There is surely no doubt that *uniformis* and *porcata* belong in the same genus.

Uniformis differs from all species of *Microrhopala* by having the thorax longer than wide, and more cylindrical. Further, the elytral puncture rows are not arranged in four regular pairs throughout, there being four rows of punctures between the second and third costae at the apical fourth. *Uroplata porcata* differs from *Microrhopala* by the same characters.

Type—U. S. National Museum.

Type Locality—Arizona.

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